ER Site No. 74: Chemical Waste Landfill

ADS: 1267
Operable Unit: Chemical Waste Landfill

Primary Contact: Dick Fate
Office Phone: 284-2568

Site History

The Chemical Waste Landfill (CWL) is approximately 1.9 acres and is in the southeast corner of TA-III. Disposal operations at the CWL began in 1962. Separate pits are reported to have been used for the disposal of acids, oxidizers, reducers, organics, reactives, bulky materials, metal, neutral compounds, and salts. Only one of the pits (for chromic acid), on the south end of the CWL, was lined. No record of disposal practices was available for operations occurring between 1962 and 1975, resulting in uncertainty concerning the actual types, amounts, and locations of waste at the site. It has been estimated that approximately 20,000 cubic yards of waste were disposed at this site.

In 1981, all liquid waste disposal in unlined trenches stopped. Liquid waste was stored next to the appropriate trench and later packaged into 55-gal (209-L) drums. Chemically-similar waste, such as oils and organic compounds, was consolidated and subsequently disposed of offsite by a hazardous waste management contractor at an approved hazardous waste disposal facility. Solid disposal into unlined trenches continued until 1985.

The CWL operated under Resource Conservation and Recovery Act (RCRA) interim status as a hazardous waste drum storage facility with a capacity for 300 drums until 1989. Waste drums were staged in segregated areas according to waste type. Drums were repacked in the temporary repack storage area before storage. A drum-crushing machine was used to crush excess empty drums left over from repack operations.

The CWL operation was discontinued completely in 1989, and all pits were covered with soil backfill. The lined chromic acid surface impoundment remained uncovered until April 1991. In response to a Tiger Team finding, it was covered with a sheet of plastic and approximately 2 in. of soil to minimize wind-blown chromium dust.

To comply with RCRA 40 CFR 265.112 groundwater monitoring requirements, five groundwater monitor wells (MW-1, MW-2, MW-3, BW-1, and BW-2) were installed at the CWL during the summer of 1985 using a mud rotary drilling method. These wells were completed at various vertical depths within the aquifer, with screened intervals ranging from 70 to 460 ft (21 to 140 m) in length.

In response to a Notice of Violation (NOV) from the New Mexico Environment Department (NMED) with regard to inadequate design and construction of the 1985 wells, four additional monitor wells (BW-3, MW-1A, MW-2A, MW-3A) were installed in 1988 with air rotary casing hammer techniques. Monitor Well MW-4 was installed in April 1990, again in response to a requirement for additional groundwater characterization from the NMED, using a combination of auger and mud-rotary techniques. MW-4 was constructed with a 20-ft (6-m) screened interval similar to that for the 1988 wells.

In the spring of 1990 the presence of trichloroethylene (TCE) in groundwater beneath the CWL was confirmed. Since this finding, a plan for corrective action of contamination has been developed and included in the Closure Plan for this site. Continued quarterly groundwater monitoring has revealed the presence of TCE mostly in three of the downgradient monitoring wells at levels hovering around the Environmental Protection Agency's (EPA's) drinking water standard. The nearest water supply well to this site is four miles to the north.

Closure Plan negotiations between DOE/SNL began with the NMED in 1988. The Closure Plan was approved by NMED in February 1993. The discovery of TCE in groundwater caused much of the delay in getting this document approved. The approved Closure Plan has been amended to include the installation of up to eight additional monitoring wells and aquifer testing to complete the characterization of the site.

In the winter/spring of 1994, four additional monitoring wells were installed: BW-4, MW-2B, MW-5, and MW-6. The three downgradient boreholes, MW-2B, MW-5, and MW-6, were completed as were two separate wells in one borehole, a 2-in. well and a 5-in. well (i.e., MW-5U [upper] and MW-5L [lower]) to quantify the vertical gradient at this site without installing two separate boreholes at each location. The upper well is installed in the uppermost aquifer and the lower well is installed approximately 25 to 30 ft deeper, in the next significant water-bearing zone.

The CMS Plan was completed in February 1995. An integrated Corrective Measures Study (CMS) Plan/Voluntary Corrective Measures (VCMs) process was initiated several months later, in May 1995. Completion of the CMS Plan in parallel with extraction of vapors from the vadose zone and excavation of the landfill contents (the VCMs) was conceived to expedite removal of the most threatening contamination and advanced determination of final corrective actions. Additionally, final corrective actions are expected to be of a lesser scope due to VCM completion. RCRA groundwater assessment monitoring has been conducted continuously since 1990, and is scheduled to continue for 30 years after closure.

The CMS Plan included a major treatability study and field pilot testing phase that was completed as part of the technology screening task. This work included a co-metabolic

bioventing treatability study, a chromium stabilization/fixation treatability study, and vapor extraction pilot testing at various locations around the site. One series of tests involved vapor extraction and air injection tests at approximately 500 feet below grade. Catalytic oxidation and vapor-phase granular activated carbon treatment technologies were evaluated during these tests, as well as different types of vacuum pumps. Concurrent with the remediation pilot testing, a vadose zone Partitioning Interwell Tracer Test (PITT) was performed to quantitatively characterize the dense non-aqueous phase liquid (DNAPL) beneath two organic disposal pits. This PITT was the first full-scale vadose zone test conducted and successfully improved the understanding of DNAPL presence and migration at the site. The information obtained from this testing was used to design a vapor extraction system and will be valuable during the drafting of the CMS Report (see "Future Work Planned" section, below).

The first VCM conducted was the Vapor Extraction VCM (VE VCM) and was completed in June 1999. The VE VCM involved the extraction of soil gas from remediation wells screened over specific intervals of the approximately 500 feet thick vadose zone. In addition, atmospheric air was injected through two wells to promote VOC contaminant removal. Six new remediation wells were installed during the first quarter of FY97 to supplement existing pilot test and groundwater monitoring wells. A total of 11 extraction wells and two air injection wells have been operated during Stage one. Approximately 5000 lbs of TCE have been removed through this system.

Excavation of the landfill (LE VCM) began September 30, 1998. All buried debris was removed from the landfill on June 7, 2001. All excavation was completed in February 2002. One additional hot spot was hand excavated in January 2003. The intent of this VCM was to excavate buried waste material and associated heavily contaminated soil from across the landfill to remove the unknowns and the potential source for future leakage from the landfill and mitigate risks posed by the buried contents adn associated highly contaminated soil.

Areas where buried debris had been identified in a 1985 trenching study and in geophysical survey images (1984, 1991, 1998) were excavated to remove all buried debris and highly contaminated soils. Most of this excavated material occurred within the top 12 feet of the landfill, although pockets of debris and localized areas of highly contaminated soils were removed to as deep as 30 feet below the original ground surface. All areas inside the landfill fence where buried debris was not identified were excavated to a depth of 4 feet below ground surface and trenches to 12 feet were completed in these areas to verify that no burial occurred in those areas. See the "Current Status of Work" section below for more information about the on-going backfilling and management of excavated and project-generated wastes.

A hydraulic Screen-All unit was used to separate the soils from the debris using a 2-inch screen. Soil samples were collected and analyzed at an on-site laboratory to characterize the material according to the waste acceptance criteria for the appropriate disposal facility. Debris items

excavated from the landfill are being managed, characterized and/or packaged for disposal at off-site permitted waste disposal facilities.

Over 180 verification samples were collected from the bottom and sides of the excavation to document the effectiveness of the excavation. These samples were analyzed by commercial laboratories specializing in environmental sample analysis. Many of these locations had also been sampled and analyzed using on-site laboratory capabilities to obtain a preliminary indication of the excavation effectiveness. The NMED collected split samples for a number of the locations to obtain duplicate data for quality assurance.

Constituents of Concern

Excavated material that has been of concern for worker exposure include: compressed gas cylinders, mercury vapors, heavy metals, pyrophoric materials, strong acids, unreacted chemicals, unexploded ordnance and explosive compounds, toxic gases, water reactive chemicals, radioactive materials, and medical waste. All of these classes of materials were encountered during the excavation without injury or incident and the primary hazards at the site have been neutralized, deactivated, and/or removed.

The primary contaminants of enduring concern at the CWL are volatile organic compounds (VOCs) and metals. The primary VOCs of concern are TCE, dichloromethane (also known as methylene chloride), tetrachloroethane (sometimes referred to as PCE), 1,1-dichloroethene (1,1-DCE), 1,1,1-trichloroethane (1,1,1-TCA), and carbon tetrachloride. Though many other types of VOCs were disposed of in the CWL, these compounds were chosen for top priority based on the following list of criteria: toxicity, resistance to biodegradation, and disposal quantity.

The primary inorganic contaminant of concern is chromium, although arsenic, mercury, lead, and a host of other heavy metals have been found in the soils in significant concentrations. It is estimated that over 4290 gal (16,500 L) of chromic acid solution were disposed of in the chromic acid pits. The chromium was disposed of in its hexavalent state, which typically forms water soluble anions that adsorb weakly to soil. One study indicates that interactions with native soils cause the chromium to form relatively insoluble calcium chromate, binding the chromium in the trivalent form. However, chromium has apparently migrated to a depth of approximately 75 ft (23 m) below grade.

Other equally toxic metals, such as beryllium, were also disposed of in the CWL, but the volumes were much less. These other metals typically form cations, which adsorb strongly to soil and therefore do not have a great potential to migrate.

Current Hazards

In the event of a fire at the CWL chemical, radiation, and/or pressure hazards may exist. Due to the ongoing nature of the work at the CWL, hazards present at the site may change frequently. Connex transportainers used to store excavated chemical compounds and batteries are lined up

along the eastern site boundary. The two large tent structures contain drummed soil and/or debris items that contains hazardous constituents, such as lead, arsenic, and mercury, in addition to low levels of radioactive isotopes such as thorium, depleted uranium and tritium. Breathing air cylinders rated at 4500 psi are located in the personnel entrance connex transportatiner on the east side of the site boundary.

Current Status of Work

Approximately 53,000 cubic yards of soil and debris were excavated during the LE VCM. All of these soils have already been hauled to the adjacent Corrective Action Management Unit (CAMU) for treatment and/or placement in the containment cell for long-term management. A fraction of the excavated soils, several thousand cubic yards, were relatively unaffected by the landfill operations and were suitable for replacement as backfill material. Intact containers of chemical products (liquids and powders), excavated batteries and other items, and radioactively contaminated items and soil are being disposed of at appropriate permitted off-site disposal facilities.

Now that the excavation is complete, site work is focused on processing the debris items excavated and backfilling the excavation. Wood, metal, and compactable debris were shredded to facilitate characterization. Over 350 apparently intact compressed gas cylinders were excavated. A contractor specializing in the management of these problem cylinders characterized and treated the contents and rendered the cylinders safe. The characterization was accomplished either by sampling through the valve or by intrusive methods. Thermal batteries have been tested for discharged status and disposed of through the Sandia Hazardous Waste Management Facility (HWMF) along with chemical products as characterization progresses, except for several hundred that require X-ray analysis to determine if any stored energy remains. Chemical batteries are being sorted by type for disposal and include rechargable NiCad, lead-acid, lithium, mercury, and alkaline batteries. Backfilling of the excavation has been accomplished to approximately 40% complete. A VCM Report detailing the LE VCM process and results is also in progress.

A CMS Report, Remedial Action Proposal and Post-Closure Care Plan and Permit Application are currently being drafted. These documents will be submitted in a single Class 3 Closure Plan modification.

Future Work Planned

Work planned for this year (2003) includes the following:

- backfilling the CWL excavation
- characterization of excavated wastes for disposal
- drafting of the LE VCM Report, Correctives Measures Study (CMS) Report, Remedial Action Proposal, and Post-Closure Care Plan and Permit Application.
- continuation of groundwater assessment monitoring.

The CMS Report will summarize all work completed to date and report on the current state of the site. Remedial alternatives will be evaluated. The Remedial Action Proposal will propose the final remedy(s) for the site. The Post-Closure Care Plan and Permit Application will detail post-closure maintenance and monitoring requirements. A public comment period will follow submission of this document to NMED. Once approved, the final remedy(s) will be implemented and a final report will be produced. After appropriate regulatory notifications, deed notations and other requirements, the post-closure period will ensue. In addition, waste management activities at the CWL are expected to continue through 2005.

Waste Volume Estimated/Generated

Wastes generated during excavation of the CWL include:

- approximately 53,000 cubic yards of excavated soil
- 4,700 cubic yards of PCB-contaminated (TSCA regulated) soil
- 360 possibly intact compressed gas cylinders
- about 900 thermal batteries
- approximately 2,000 containers of unknown chemical products
- approximately 300 cubic yards of hazardous debris, including wood, metal and concrete
- numerous large metal structures including ovens, tanks, vats, etc.

In addition, project-generated PPE, plastic sheeting, silt fencing, lab waste, decontamination (decon) water, and other materials are generated and disposed on a routine basis during the excavation. Updates will be made as waste management and soil excavation progress.
To date, 184 cubic yards of hazardous soil, around 21,000 gallons of hazardous purge and decon water, 24 cubic yards of non-regulated soil, 8045 gallons of non-regulated purge and decon water, and multiple drums of PPE wastes have been generated as a result of characterization, groundwater monitoring and vapor extraction activities.

Information for ER Site 74 was last updated Jan 22, 2003.